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ABSTRACT

Modern behavioral research focuses on the possibility of a direct measurement of value preferences, which are conceived as important causal variables of behavior. A method and procedure for the measurement and representation of human value factors is presented. The thesis was studied that valuation results from an active inquiring agent whose cognition rests on the extraction and abstraction of invariants. The mental processes of 35 randomly selected workers (mechanics) from Sweden, England, West Germany, Italy, and the United States were studied via Perspective Text Analysis (an ecologically oriented theory of information synthesis). Seven subjects were chosen from each country. Unrestricted verbal responses of the subjects to three open-ended questions concerning information management and utilization were analyzed. The subjects' mental processes were measured in accordance with an axiological approach. The outcome of the valuation was formulated into sequential flowcharts. The results show great variations in the pattern of displayed valuations among the five cultures. Each pattern is characterized by a distinctive value factor (pessimism, criticism, positivism, optimism, and individualism). (TJH)

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Axiological Measurement of Human Value Factors in Mental Processes

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Abstract

Modern behavioral research focuses on the possibility of a direct measurement of value preferences. These are conceived as important casual variables of behavior. The article presents a method and a procedure for the measurement and representation of human value factors. By means of Perspective Text Analysis mental processes of workers from Sweden, England, West Germany, Italy and the United States were captured and topographically represented elsewhere. In this study, the mental processes are measured in accordance with an axiological approach. The outcome of the valuation is represented in sequential flow charts. The experimental subjects were 35 randomly selected mechanics. The results show great variations in the pattern of displayed valuations. Each pattern is characterized by a distinctive value factor.

Nobody should be surprised to find that a profound analysis of human value systems leads to insights into the way we may change our ecological and social conditions. This is the tenet of Sperry's (1983) work on science and morality priority. In this article we analyse the results of Perspective Text Analysis in order to map the axiological values of mental processes as they are embedded in language.

Perspective Text Analysis

Perspective Text Analysis is an ecologically oriented theory of information synthesis. It rests on a model for the analysis of intentionality and orientation as expressed in natural language. Language has the central function of being a cognitive instrument for conveying valuations to and from the human being. We have noticed in the research literature a renewed interest in analysis of verbal behavior, like content analysis and related approaches (Gottschalk, Lolas, & Viney, 1986). Traditional content analysis is object-governed. This means that knowledge of a subject's mental state can be obtained only to the extent that its produced words can serve as symbols for facts to be associatively linked to networks of concepts, for example semantic networks, whose theoretical implication may vary between scientists and over time. In contrast, the method of Perspective Text Analysis is subject-governed. By this is meant that a text producer, the agent, is the point of reference in the analysis. The underlying model makes the distinction between the objective facts of a text and their perspective information. Through a transcendental logic of natural language, the method via multivariate analysis has as its result a conceptual structure describing and synthesizing what the producer of the text is

conscious of (Bierschenk & Bierschenk, 1986, a,b,c; 1987). In such an analysis the structure is visualized as a cube in which the text producer's conceptualizing process and reasons are projected against the background and bottom respectively of the cube, while the perspective is projected against the foreground and top.

What should be especially pointed out here is that the higher order relations abstracted are structurally represented by means of topologically described dimensions. The perspective and ecological invariants lying in the textual flow are made visible by the transformations depicted in the form of the cubic space. The cognitive process which develops in such a space will be the starting point for an axiological analysis of concept and concept relations.

Axiological Value Types

Axiology is the study of the nature of values and value judgment. Hartman (1967) proposed axiology as the science of values or moral conduct. He stipulates that values of life exist within three fundamental dimensions: (1) personal and spiritual, (2) practical and situational, and (3) theoretical and normative. Within this three dimensional space, the personal and spiritual values refer to the intrinsic nature of the person. By intrinsic it is meant that which is unique and irreplacable in a person's being. The practical and situational values address extrinsic aspects of human life. By extrinsic it is referred to values of everyday life, everything that can be captured by the perceptual system. Everything concrete, tangible, and material in space and time would qualify for the second dimension. The theoretical and normative values are related to the ideational world, addressing

all kinds of theories, systems, models, rules, and concepts, that is, the abstractions of the human mind.

All objects and values can be conceived to be of an intrinsic, an extrinsic, or a systemic nature. The formal combination of object and value in a 3^2 dimensional matrix gives rise to nine different axiological value types (Table 1). Further, each axiological value has a positive and a negative aspect. Thus the value spectrum consists of a total of eighteen values. The definition of "an axiological value" contains the formal relation of the intention of a concept (norm) and its extension (object). An object has value to the degree that it fulfills the intention of its concept. Operationally expressed this means that the value is a measure of how well objects stand up to norms. The part of the norm that is fulfilled is defined as positive value, and the part that is non-fulfilled is defined as negative value.

Validity and reliability. Hartman has been called the world's first applier of formal axiology (Austin & Garwood, 1977). The foundations of Hartman's major work (1967) have been found tenable by his colleagues (Austin & Garwood, 1977; Davis, 1978; Moore, 1973). To apply his theory, Hartman orders the different axiological values in a reference order. His value profile (HVP) (Hartman, 1973) uses two scales of eighteen items (Table 1). Each item corresponds to one type of axiological value for two specified objects of valuation, namely the world and the self.

As can be seen from Table 1, there are two orders. The second contains a minor revision of Hartman's reference order by Schildt (1983). He developed a Swedish version which he calls the

Table 1

Construction of Axiological Value Types together with their Reference Orders

Position number	Hartman (HVP) order	Schildt (PS) order
1	I^{I}_{I}	I^{I}_{I}
2	I^{E}_{I}	I^{E}_{I}
3	I^{S}_{I}	I^{S}_{I}
4	E^{I}_{I}	E^{I}_{I}
5	S^{I}_{I}	E^{E}_{I}
6	E^{E}_{I}	E^{S}_{I}
7	E^{S}_{I}	S^{I}_{I}
8	S^{E}_{I}	S^{E}_{I}
9	S^{S}_{I}	S^{S}_{I}
10	S_{S}	S_{S}
11	S_{E}	S_{E}
12	E_{S}	S_{I}
13	E_{E}	E_{S}
14	S_{I}	E_{E}
15	E_{I}	E_{I}
16	I_{S}	I_{S}
17	I_{E}	I_{E}
18	I_{I}	I_{I}

Note: A positive intrinsic valuation (I-norm) of an extrinsic object (E-object) is written I^{E}, i.e., I norm "looks up to" E object. A negative systemic valuation (S-norm) of an extrinsic object (E-object) is written S_{E}, i.e., S-norm "looks down on" E-object.

Provaluator System (Schildt, 1986). In this order a slight change was made mainly concerning the positions of systemic valuations of intrinsic objects (persons)(from fifteen to twelve and five to seven). The reference order now used is a fully symmetric one for which the distances at the ends are greater than in the middle. Research on the reliability of the two orders has shown that both can reliably be applied (Bystam & Freund, 1977; Elliott, 1969; Hartman, 1973; Lohman, 1968; Mattsson, 1987; 1988; Schildt, 1983).

Method

The valuation of mental processes takes its departures in an article on consciousness as a function of knowledge and culture (Bierschenk & Bierschenk, 1987). The article reports five different cubic spaces on the basis of culture as the differentiating variable. For the purpose of ordering the concepts and concept relations in correspondence with Table 1, the Figure component of the cubes will be analyzed. The Figure component denotes what is figurative in the text and is projected on the background of the cubic space.

Subjects

A Swedish multinational company asked their workers three open-ended questions concerning information management and use. The process of selection resulted in five groups of workers, each group containing seven randomly selected subjects. The groups represent five cultural contexts: Sweden, England, West Germany, Italy, and the United States.

Materials

Unrestricted verbal responses to the following questions were analyzed:

1. Do you have any ideas/suggestions how to encourage more mechanics to use the service manuals?
2. Do you have any suggestion how getting information to you can be improved?
3. Do you think too much (or too little) paper (information) is sent out?

These questions highlight different aspects of import to the management and selective dissemination of information. To counterbalance the variation in translation they have been treated as if one single question was posed.

Design and Procedure

The cubic space representation is especially suitable when reliable observations consist of discontinuities, that is, singularities. Singularities are the highest points of a curve and have theoretical foundation in topology. This means that singularities can be conceived as invariants. As is shown in Bierschenk & Bierschenk (1987), the sides of the planes representing the curve are made up of terminal states. These are the result of cluster analyses, while the singularities within the plane describe the cycles and paths of the transformational process, which created the text. All concepts generated will now be studied with respect to their closest axiological correspondence.

Results

The mental processes of the workers in the five different cultural settings are described in Bierschenk & Bierschenk (1987, pp 12, 15, 19, 23, and 29). These are represented with respect to their axiological values in Figures 1-5. As will become obvious in the following, there are great variations between the five

cultures.

The Valuation of the Mental Process of Swedish Workers

As can be seen from Figure 1, the process is governed by three terminal states and has produced two singularities. The process starts with the terminal state named TECHNICAL SIMPLIFICATION, which is the prototypical description of the cluster which represents the starting point for the process (step 0). It carries the smallest positive axiological value (9) implying a systemic valuation of a systemic object. When the process passes through the next terminal state (step 1) the concept is transformed by a concept SIMPLE-MINDEDNESS, which carries considerable negative value (13). According to Table 1, second order, the concept signals a negative extrinsic valuation of a systemic object. Thus it gives expression to a non-effort vis-à-vis the technical system. The result of the transformation is the first singularity in the process named UNSOPHISTICATION. The concept addresses a lack of systemic qualities in the person-system interaction. The corresponding axiological value to be found in Table 1 is the least negative one (10). At the second and final step the concept LABOUROUSNESS operates and transforms the first singularity into LACK OF QUALITY. Labourousness expresses a negative systemic valuation of an extrinsic object (11). This means that the worker is forced to invest time into work. This transformation results in a negatively valued singularity of identical value type (11). Thus a negative systemic evaluation of something extrinsic to the worker, namely work, is at hand.

Looking at the process as a whole from the axiological point of view, it is characterized by a few values of which four

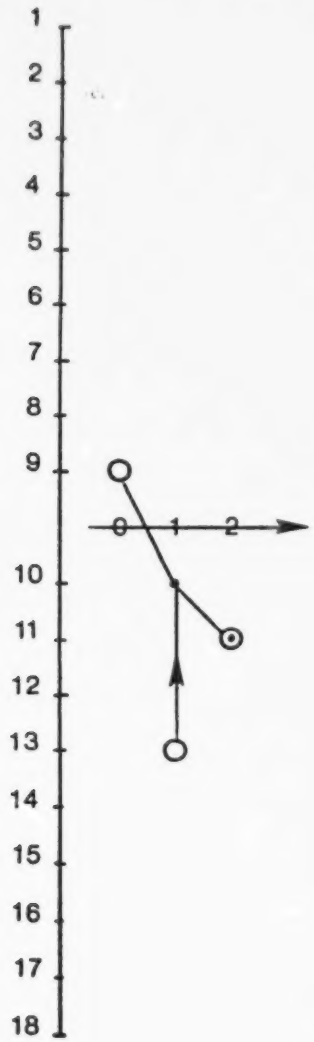

Figure 1. Mental process of Swedish workers as sequential flow in the axiological reference order. The vertical axis shows the rank order and horizontal the realized steps in the process. Circles represent terminal states. Dots indicate the results of the transformations. Lines between dots or circles and dots depict the course of the process. The arrows indicate directionality. A dot within a circle implies that the operating terminal state produced no change in the value of the resulting singularity.

out of five carry a negative valuation. The concepts express a disinterest in technical information, and an unconcernedness with job quality. Further, the process is very simple. It shows no signs of jumps, that is, value enrichment. The process has no subcycles and ends in the negative sphere.

The Valuation of the Mental Process of English Workers

The initial state of the process produced by the English workers, as visualized in Figure 2, gives expression to MODEL CRITICISM. Model in this case refers to the abstract aspect of a product. Thus the process takes its departure in a negative systemic valuation of a systemic object (10). The next terminal state to be passed is called LACK OF INFORMATION, which refers to the same value type (10). This negatively valued concept brings about the first singularity PREPAREDNESS RESTRICTIONS. The outcome of the transformation is an even more negatively valued concept. Its implication is a negative systemic perspective on concrete actions. Actions are seen as extrinsic objects, which give rise to the axiological value (11). In the next step, the terminal state EMBARRASSMENT forces the curve to continue in the negative direction. The concept means that the workers are forced into a situation where they have to perform under the risk of loosing their face. Thus a negative extrinsic valuation of the intrinsic object, the self, is denoted with the value (15). The result of this transformation leads to the singularity INFEASIBILITY carrying the value (14). The axiological value signals a situation where it is impractical to carry out the expected work, which means a negative extrinsic valuation of something extrinsic, namely, work. The following transformations brought about by the concept of OVERABUNDANCE forces the curve to

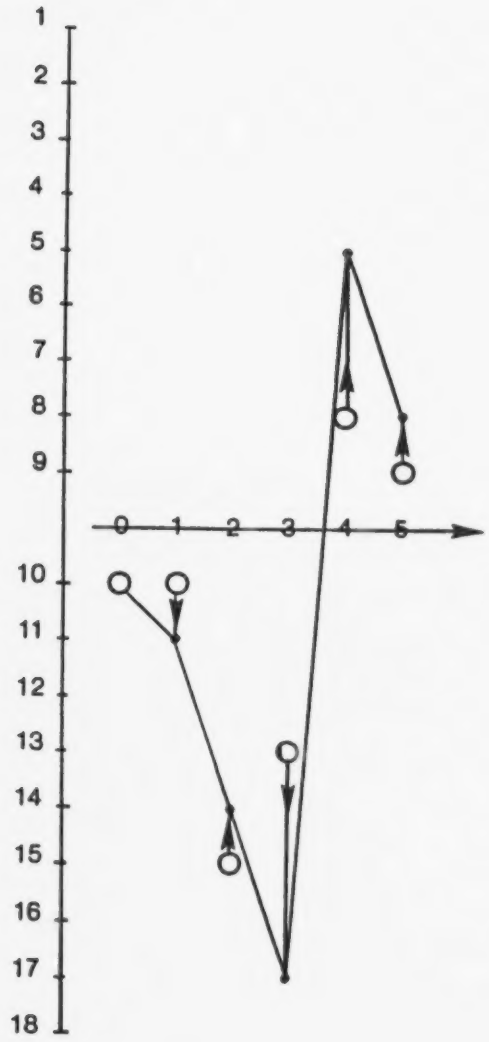

Figure 2. Mental process of English workers as sequential flow in the axiological reference order. The vertical axis shows the rank order and horizontal the realized steps in the process. Circles represent terminal states. Dots indicate the results of the transformations. Lines between dots or circles and dots depict the course of the process. The arrows indicate directionality.

its lowest point. The concept refers to the impracticality of too much imformation, which gives expression to a negative extrinsic valuation of a systemic object (13). This creates the singularity named DISCONTENTMENT. It implies a negative intrinsic valuation of the work place, which is an extrinsic object (17). This is a very strong negative outcome of the process and would be a rather serious state were it the final outcome. Fortunately it can be observed a major jump into the positive direction. At the fourth step in the process, the terminal state INSTRUCTIONAL AID implies a positive systemic view (8) on carrying out the actual work. This jump transforms the negative attitude into SERVICE SUPPORT. The concept generates a positive practical valuation of the actual work (5). At the fifth and final step the terminal state ORGANIZATION OF MEDIATION, which is a systemic view on the actual functioning of the communication (extrinsic object), leads to value (9). The transformation brought about moves the process towards a less positive valuation in that INFORMATION QUALITY expresses a systemic view on a systemic object (8). However, the process settles in its final phase on a positive axiological valuation.

By summarizing the outcome of the valuation of the mental process of the English workers, it can be stated that it is richer compared to the Swedish case. It has a longer cycle and shows a major jump from the negative sphere into the positive. The negative part of the curve concentrates on the inefficiency of service support, while the second part clearly points towards a more positive outlook, that is, towards possible solutions.

<u>The Valuation of the Mental Process of West German Workers</u>

The mental process of the West German workers is

depicted in Figure 3. The terminal state which initiates the process is called AQUISITION OF INSTRUCTION. The practical treatment of knowledge is at the core implying a positive extrinsic valuation of an intrinsic object (6). The transition through the next state produces a transformation in the positive direction. The transformation is brought about by SERVICE KEY which is associated with a positive systemic view on an extrinsic object, namely service work (8). The result is the singularity HIGH QUALITY SERVICE, which means an extrinsic view on an extrinsic object, that is, well done service (5). The curve produced thus far points towards high ambition and willingness to achieve performance of high standards. On the other hand, as shown in Figure 3, the curve indicates a steep fall into the negative sphere of the valuation. The transformation resulting in the downward move is due to the terminal state LACK OF EXPLANATION, which is a negative systemic view on an intrinsic object (12). This means that the workers are unable to make practical use of the information provided by the company. The resulting singularity is SERVICE DEGRADATION (14). A negative extrinsic view on an extrinsic object translates into a service resulting in an insufficient performance. The process continues into INFORMATION LAG, which carries another negative value (10). The transformation produces COMPETENCE REDUCTION (14). The deep fall into the negative value sphere indicates a perceived deficit in knowledge development and maintenance. From here, the process in its fifth and final step jumps back into the positive sphere. The transformation is brought about through the positive value associated with CONTROL OF INFORMATION PROCESSING (9). The concept is of purely systemic nature and leads to the final

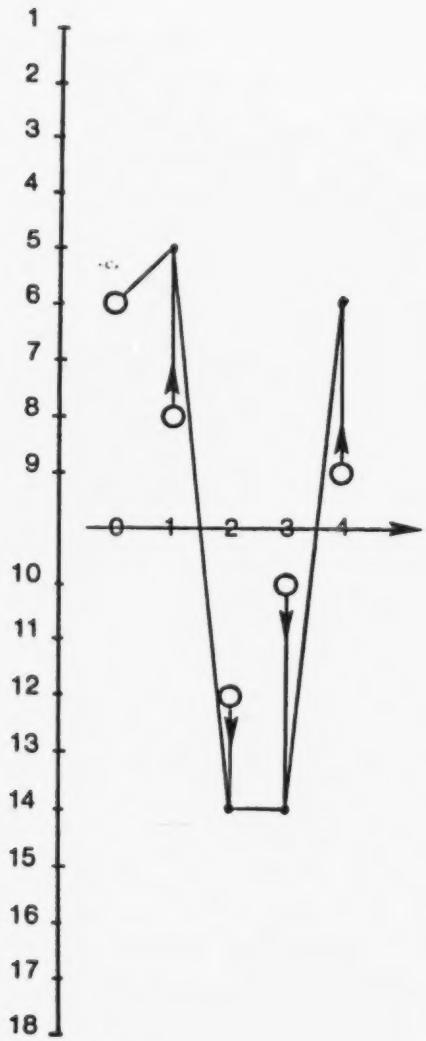

Figure 3. Mental process of West German workers as sequential flow in the axiological reference order. The vertical axis shows the rank order and horizontal the realized steps in the process. Circles represent terminal states. Dots indicate the results of the transformations. Lines between dots or circles and dots depict the course of the process. The arrows indicate directionality.

point of the curve, namely KNOWLEDGE MAINTENANCE, which carries even higher positive value (6), an extrinsic view on a systemic object.

Taken together, the mental process depicted and decribed shows a higher enrichment in that two jumps have come about. Further, the shape of its cycle shows a U-form. Both ends of the curve express an observational conduct. At the beginning of the process development, the West German workers state their criteria and at the end they indicate a wish for information control. At the bottom of the U-form they clearly express what is wanting with respect to their ambition to produce work of high quality.

The Valuation of the Mental Process of Italian Workers

In Figure 4, the mental process of the Italian workers is depicted. As can be seen, the process include two cycles. The longer one starts at step 0, the shorter one at step 7. The description will begin with the longer cycle. The initial state of that cycle is called LEARNING CONDITIONS and carries the axiological value (6). The initial state is transformed by a transition through the state called INSTRUCTION carrying the same value (6) as the initial state. The result of the transformation produces the first singularity of this cycle, which is named EDUCATION, having the same positive value (6) as the terminal state which led to this result. Therefore, the resulting singularity is shown within the operating terminal state. All three valuations refer to a practical aspect, indicated by a letter E in Table 1, of knowledge, indicated by a letter S. Transformed by the state TESTING which carries the value (8), the resulting transformation is named DIAGNOSIS and has the same value as Testing. Thus the operational terminal state has not

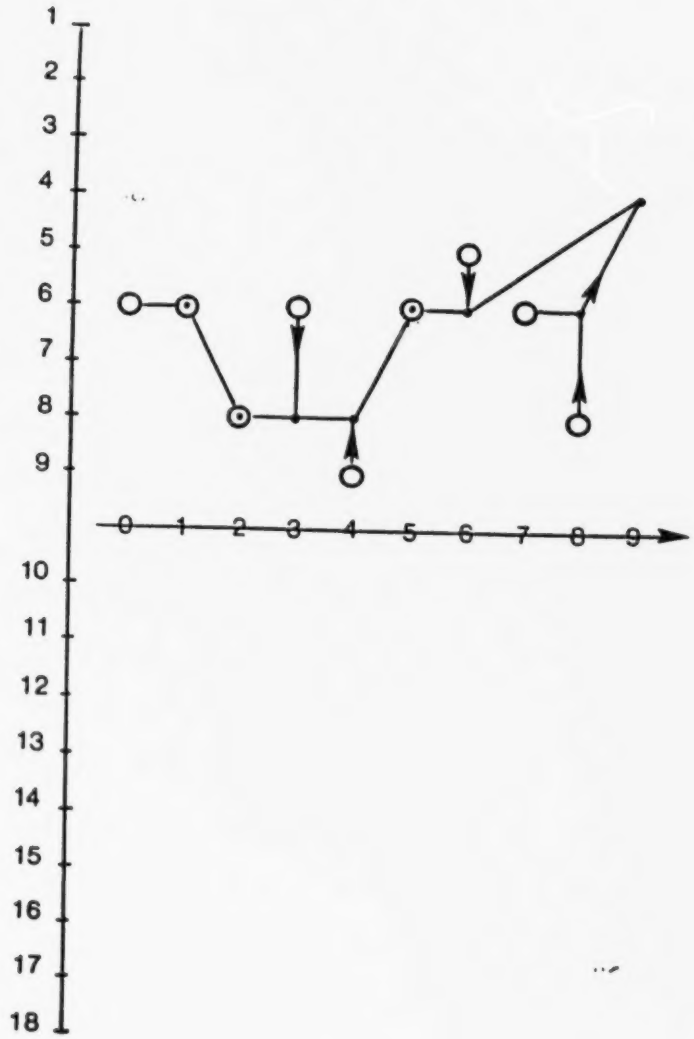

Figure 4. Mental process of Italian workers as a sequential flow in the axiological reference order. The vertical axis shows the rank order and horizontal the realized steps in the process. Circles represent terminal states. Dots indicate the results of the transformations. Lines between dots or circles and dots depict the course of the process. The arrows indicate directionality. A dot within a circle implies that the operating terminal state produced no change in the value of the resulting singularity.

produced any change in the value of the singularity. At step 3, PROVISION (6) transforms Diagnosis into INSTRUCTIONAL SEQUENCE (8). The next following state, SPEED OF INFORMATION also carries a positive systemic value (9) and transforms the process into APPREHENSION (8), the mental understanding of something concrete. SUFFICIENCY OF INFORMATION transforms the Apprehension into ACQUISITION. Here, again, the operating terminal state produces no change in the valuation of the singularity. Both are associated with the value (6). MODES OF INSTRUCTION (5) transforms Acquisition into INTELLECTUAL SKILLS (6). All these values define a narrow band. Conceptually they are tightly related. They include either an extrinsic valuation of a systemic object or concern the practicality of mental constructs.

The second cycle of the process starts with TUTORAGE (6), which becomes transformed when the process transits through ADVANTAGE (8). The resulting singularity of the second cycle is EASE OF LEARNING (6). The valuation is not different from the values of the first cycle, but when the second cycle crosses the first one, a new singularity emerges, called ENABLEMENT (4). This is not only the highest point of the curves but also the highest value of the process. It corresponds to the practical development of personhood.

In summary, the mental process of the Italian workers is characterized by a narrow band of values. There are no negative values and no jumps, which imply a certain degree of uniformity. However, two cycles have to be interpreted as an indication of higher structural richness. On the other hand, all that has been obtained is a peak at the value (4) aiming at the practical development of the self. What is produced by the process in its

intirety is a hopeful dwelling into the future.

The Valuation of the Mental Process of American Workers

The mental process pictured in Figure 5 shows two cycles. The second cycle starts at step 7. In contrast to the description given, the first cycle starts with a rather negative valuation carried by the start state DECLINATION (13). The initial observation is that the information system does not function properly. This state is transformed by the terminal state PERSONALIZATION (7). This is a positive value which expresses an S-norm and an E-object, that is, a humanisation of the flow of technical information. It results in a singularity carrying an even higher valuation, called ENABLEMENT (4), which by the transition through the state COORDINATION (8) produces CONSTRUCTIVENESS (5). The process now declines further when it moves through the state of INFORMATION ACCESS (6), which transforms the process into COGNITIVE OPERATION (8), that is, the ability to mentally handle reality. The state of REASONABLENESS implies the requirement of a positive systemic valuation (7) of an intrinsic object. The transformational outcome is REGOGNITION OF ABILITY (8). This result can be interpreted as a rational view (S-norm) on the workers' practical ability manifesting itself in salary. The state METHODOLOGICAL INNOVATION (6) implies the functioning of a new technical system (E-norm) in order to further positive outcomes (S-object). The curve now makes a major jump into the negative sphere. The source for this jump is the terminal state INFORMATION LAG (10). The produced singularity is the final one of the first cycle, indicating an AUTHORIZATION that is insufficient (11).

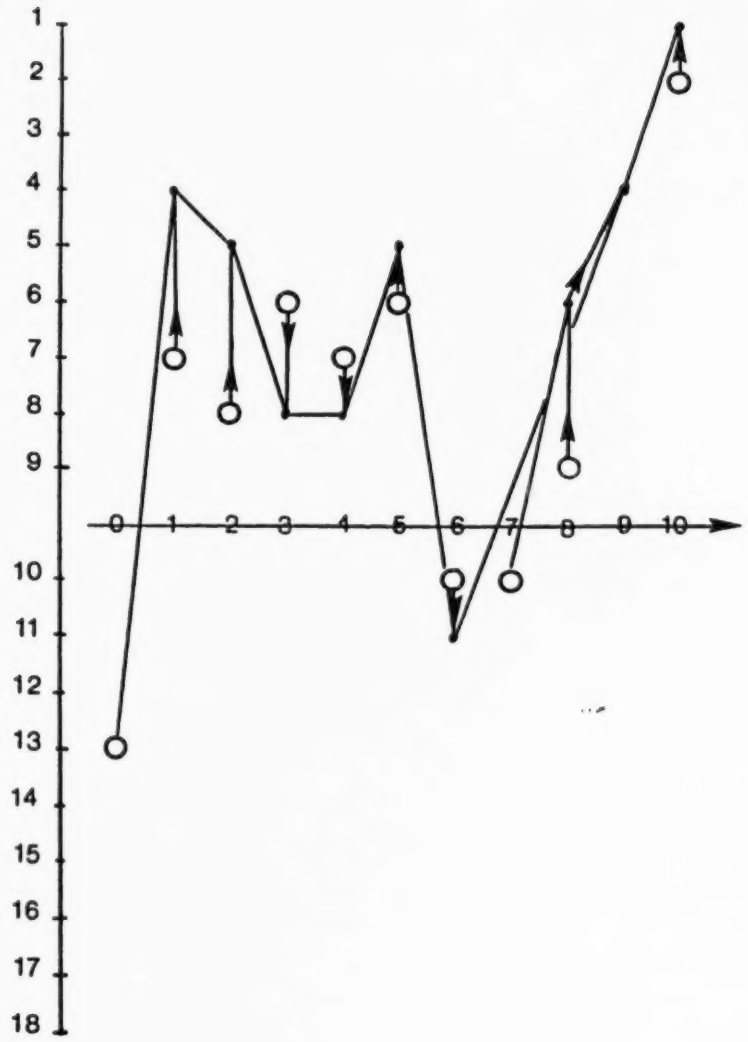

Figure 5. Mental process of American workers as sequential flow in the axiological reference order. The vertical axis shows the rank order and horizontal the realized steps in the process. Circles represent terminal states. Dots indicate the results of the transformations. Lines between dots or circles and dotsdepict the course of the process. The arrows indicate directionality.

The second cycle takes its departure in a negatively valued terminal state, LACK OF INFORMATION (10). The cycle continues through INFORMATION TIMING (9) and produces PROVISION (6) as the only singularity of the second cycle. Thus the second cycle concerns the actual handling of information. At the ninth step the second cycle crosses the first one leading to a major jump back into the positive sphere, resulting in the singularity EDIFICATION, which carries a positive extrinsic valuation (4) of an intrinsic object. Finally the process transits through the state of PRETENSION, which signals a positive feeling (2) towards the work (I-norm, E-object). The resulting singularity is the highest of the entire process and is called WORTHINESS (1), the feeling of self-respect (I-norm, I-object).

In summing up, it can be concluded that the mental process of the workers from the United States shows not only structural variations as indicated by the two cycles, but also the highest degree of enrichment. The first cycle can be looked upon as a parabolic curve. Both ends reside in the sphere of negative valuation, while the curve itself gives expression to self-confidence. The workers perceive clearly a problem in the information management, which has to be solved by the company. They also contribute constructively to the solution of the problem. On the other hand, their confidence is not met by the company, which deprives them of the possibility of becoming authoritative in their field. The second cycle provides the conditions for their maintaining of self-respect, which raises the entire process into the highest valuation realm possible. Thus the entire process can be seen as the assertion of one's uniqueness.

Discussion

The thesis underlying this article is that valuation is the result of an active inquiring agent and that his cognition rests on the extraction and abstraction of invariants. It is a mark of mentality that the agent always conceives the meaning of object-event relationships. As a consequence, the two key concepts perspective and viewpoint play a central role. Perspective Text Analysis rests on an algorithm that has the capacity to determine the agent function (perspective) which governs language production. Perspective control lies in the definition of the transposition of the agent. Thus the agent function determines what viewpoints are chosen and how they change throughout a text.

The invariants lying in the textual flow have been made visible by the transformations depicted topologically in Bierschenk & Bierschenk (1987). The mental processes which have developed show substantial variations with respect to five cultural contexts. Based on the second axiological reference order in Table 1, "the human value factor" (Sperry, 1983, p 9) has been extracted.

The second thesis which is tested here is that the value of the objects can be directly perceived, which implies that the mental processes as visualized in Figures 1-5 directly reflect the valuations of these objects.

The dynamics of the human value factor has resulted in five different profiles. The first to be considered is the profile pertaining to the Swedish sample. It is a very simple kind, limited in the number of values, and shows no enrichment. The

latent source which controls the verbal flow of the Swedish sample seems to be tied to a PESSIMISTIC value priority. A quick glance at the profile of the English workers shows an abrupt change signalling a discontinuity in their valuation. Although they produce the most severe negative point of view, nevertheless they manage to raise the curve, which is the inherent nature of CRITICISM. The value structure of the West German workers with its typical U-form, indicating two abrupt changes, is elaborated, comparatively concentrated, and balanced. According to the mental process they have produced, knowledge is limited to the communication of facts and experience, which is the core of POSITIVISM. The dynamics of the mental process produced by the Italian workers shows no abrupt changes. It moves rather smoothly towards its final singularity within the positive sphere. Their valuation seems to express reliance and hopefulness on the forthcoming possibilities, which should be at the very heart of OPTIMISM. The fifth and final profile shows two parts. The first can be described by a parabolic form, starting and ending in a negative valuation, although its main tenet is positive. The second part, characterized by a sharp rise, changes the profile towards the highest possible axiological valuation, that is, towards the self. This must be interpreted such that INDIVIDUALISM is the controlling and dominating factor when the American workers express their value priority.

Inherent in the process of bringing out the human value factor is the process of transforming meaningful behavior into symbolic expressions. Thus subjective values become an integral part of objective brain processes. At this level the transformation entwines the perpective and viewpoints in the same

way as organism and environment are entwined.

The analysis of symbolic expressions could not be carried out before we were able to experimentally detach the textual perspective from its viewpoints. This was done by means of the Perspective Text Analysis. We were able to use the extracted relations for a topographical description and axiological valuation of the perceived dimensions. On the basis of the textual transformations described and made visible in the form of the three-dimensional value space of Hartman, it became obvious that the world conceptually devides into five different profiles. Underlying these profiles are five human value factors, namely pessimism, criticism, positivism, optimism, and individualism. Thus the cognitive processes are not only different but also different in the conscious mental awareness, both in relation to each other and in relation to the source of observation.

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